

## A NEW SPECIES OF PROTURAN FROM NORTHEAST, CHINA (PROTURA, ACERENTOMIDAE)

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**Abstract** *Filientomon qianshanense*, a new species of proturan is described from Mt. Qian, Anshan, Liaoning Province, China. The abdominal legs II and III of new species each with a single seta, and the claw of foretarsus with one inner flap and one outer flap. An updated key to the world species of *Filientomon* is presented.

**Key words** Protura, Acerentomidae, *Filientomon*, new species, China.

### 1 Introduction

The genus *Filientomon* was established by Rusek (1974) with type species *Filientomon takanawanum* (Imadaté 1956). It is characterized by the filiform sensillum  $t-1$  and not modified setae  $\beta 1$  and  $\delta 4$  on the foretarsus, with three pairs of anterior setae ( $A2$ ,  $A3$  and  $A4$ ) on mesonotum and four pairs of anterior setae ( $A2$ ,  $A3$ ,  $A4$  and  $A5$ ) on metanotum, with four setae on the urosternite of abdominal segment VIII and with well developed striate band. Up to now, nine species were described in the world and only one species known in China (Tuxen, 1964; Imadaté, 1974, 1977; Lee *et al.*, 1988; Szeptycki, 1988; Yin, 1999; Nakamura, 2001, 2004). In present paper, a new species of *Filientomon* is described from China and a key to the world species of the genus is provided.

### 2 Material and Methods

The specimens were collected during the soil animal survey of Northeast China using Tullgren funnels. All specimens were mounted on the slide using Hoyer's medium and dried for three days in an oven at 60°C. Type specimens are deposited in Shanghai Entomological Museum (SEM), Institute of Plant Physiology & Ecology, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences.

### 3 Abbreviations

$a$ : additional seta.  $a'-c'$ : interior sensilla on foretarsus.  $a-g$ : exterior sensilla on foretarsus.  $al$ : anterolateral pore.  $A1-A5$ : anterior setae.  $Ac$ : central anterior seta.  $BS$ : ratio of distance between the proximal end and  $t-1$ /distance between  $t-1$  and distal end on foretarsus.  $CF$ : ratio of length of hind part of maxillary gland/length of head.  $EU$ : ratio of length of the empodium/length of the claw.  $l$ : lateral pore.  $ls$ : lateral seta.  $M$ : middle seta.  $Mc$ : central middle seta.  $pp$ : postpseudocular seta.  $psm$ : posterosubmedial pore.  $P1-$

$P5$ : posterior setae.  $Pc$ : central posterior seta.  $PR$ : ratio of length of the head/length of pseudoculus.  $t-1-t-3$ : dorsal sensilla on foretarsus.  $TR$ : ratio of foretarsal length/length of the claw.  $\beta$ : ventral setae on foretarsus.  $\gamma$ : interior setae on foretarsus.  $\delta$ : exterior setae on foretarsus.

### 4 Description

*Filientomon qianshanense* sp. nov. (Figs. 1–19)

Adult. Body length 124–1304  $\mu\text{m}$  ( $n=4$ ), width 239–240  $\mu\text{m}$  ( $n=4$ ).

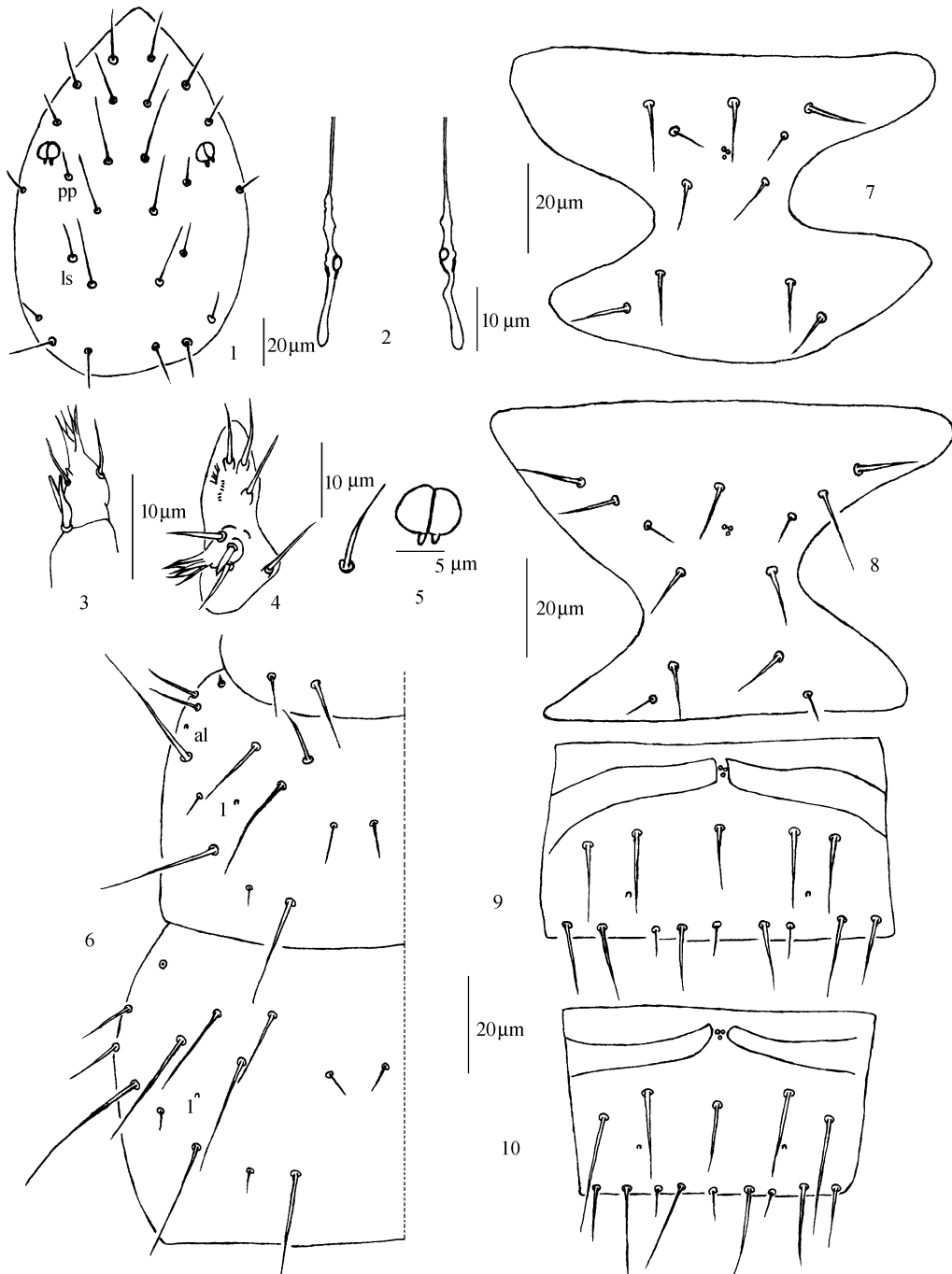
Head Elliptic, length 144–158  $\mu\text{m}$ , width 103–110  $\mu\text{m}$  ( $n=4$ ). Postpseudocular seta present. Seta  $ls$  short and  $a$  absent. Rostrum not protruded. Dorsal and ventral side of head with no modified setae. Pseudoculus length 7.9  $\mu\text{m}$ , width 9.9  $\mu\text{m}$ .  $PR=18.3$ . Canal of maxillary gland thin, with some irregular protuberance on the distal part and blind end slightly bulked. Calyx has a helmet-like appendix. Hind part of maxillary gland length 15.8–19.7  $\mu\text{m}$ .  $CF=8.0-9.8$ . Maxillary palpus with two sensilla, one parallel-sided, the other one sword-like, broadened at the basal. Labial palpus well developed, with two setae and one gemmiform sensillum (Figs. 1–5).

Thorax. Chaetotaxy as shown in Table 1. Mesonotum with three pairs of anterior setae ( $A2$ ,  $A3$  and  $A4$ ), seta  $P1a$  and  $P2a$  short and small,  $P5a$  short cone-shaped. Metanotum with four pairs of anterior setae ( $A2$ ,  $A3$ ,  $A4$  and  $A5$ ). Pronotum with no pores, mesonotum with pore  $al$  and  $l$ , metanotum with pore  $l$ . Prosternum with no pores. Mesosternum and metasternum with one group of three small pores situated in anterior half of sternites (Figs. 6–8).

Foretarsal length 97–99  $\mu\text{m}$ , claw 33.5–37.4  $\mu\text{m}$ , with one inner flap and one outer flap, outer flap close to the terminal of the claw.  $TR=2.6-2.9$ ; Empodium length 4.9–5.9  $\mu\text{m}$ ,  $EU=0.13-0.17$ ; S-shaped seta subequal to claw. Dorsal sensillum  $t-1$  filiform,  $BS=$

0.63-0.69;  $t_2$  slim;  $t_3$  small and lanceolate. Exterior sensillum  $a$  thin, far surpassing base of  $c$  and  $d$ , reaching base of  $e$ ;  $b$  robust and extremely long, slightly surpassing base of  $v_4$ ;  $c$  longer than  $d$ ;  $d$  nearer to  $e$  than to  $c$ ; sensillum  $e$  subequal to  $f$ ;  $f$  and  $g$  reaching base of claw;  $g$  short. Interior sensillum  $a'$  broad and

long, near to  $t_1$ ;  $b'$  absent;  $c'$  thin and long, its apex surpassing base of claw. Length formula of foretarsal sensilla:  $t_3 < t_1 < d = g < t_2 < c = c' = e = f < a' < a < b$  (Figs 11-12). Middle tarsal length 45.3-49.3  $\mu\text{m}$ , claw length 17.7-21.7  $\mu\text{m}$ . Hind tarsal length 53.2-57.1  $\mu\text{m}$ , claw length 21.7-23.6  $\mu\text{m}$ .



Figs 1-10. *Filicentomon qianshanense* sp. nov. 1. Head, dorsal view. 2. Canal of maxillary gland. 3. Maxillary palpus. 4. Labium. 5. Pseudoculus. 6. Parts of pronotum, mesonotum and metanotum. 7. Part of mesosternum VI. 8. Part of metasternum. 9. Urosternite VI. 10. Urosternite VII.

Abdomen. Chaetotaxy as shown in Table 1. Abdominal tergite I with three pairs of anterior setae ( $A1$ ,  $A2$  and  $A3$ ), with seven pair of posterior setae,  $P4a$  lacked. Urotergites II- VII with five pairs of anterior

setae ( $A1$ ,  $A2$ ,  $A3$ ,  $A4$  and  $A5$ ). Posterior setae of urotergites II- VII are variable: urotergite II with eight pairs of posterior setae, urotergite III with eight or nine pairs of posterior setae, urotergites IV- VII with nine pairs

of posterior setae, accessory setae short hair-like. Urotergite I with pore *psm*, other pores absent. Urotergites II- VII with pore *al* and *psm*.

Table 1. Chaetotaxy of *Filientomon qianshanense* sp. nov.

	Dorsal		Ventral	
	formula	composition of setae	formula	composition of setae
Thorax				
I	4	1, 2	$\frac{4-4}{6}$	A1, 2, M1, 2 P1, 2, 3
II	$\frac{8}{16}$	A2, 3, 4, M P1, 1a, 2, 2a, 3, 4, 5, 5a	$\frac{5-2}{4}$	Ac, 2, 3, M P1, 2
III	$\frac{10}{16}$	A2, 3, 4, 5, M P1, 1a, 2, 2a, 3, 4, 5, 5a	$\frac{7-2}{4}$	Ac, 2, 3, 4, M P1, 2
Abdomen				
I	$\frac{6}{14}$	A1, 2, 3 P1, 1a, 2, 2a, 3, 4, 5	$\frac{3}{4}$	Ac, 2 P1, 2
II	$\frac{10}{16}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{3}{5}$	Ac, 2 Pc, 2, 3
III	$\frac{10}{16 (18)}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, (3a), 4, 4a, 5	$\frac{5}{5}$	Ac, 2, 3 Pc, 2, 3
IV- V	$\frac{10}{18}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{5}{8}$	Ac, 2, 3 P1, 1a, 2, 3
VI- VII	$\frac{10}{18}$	A1, 2, 3, 4, 5 P1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{5}{9}$	Ac, 2, 3 Pc, 1, 1a, 2, 3
VIII	$\frac{8-7}{8}$	A1, 2, 3, 4, Mc, 2, 3, 4 P2, 3, 4, 5	$\frac{4}{0}$	1, 2
IX	14	1, 2, 3, 3a, 4, 4a, 5	4	1, 2
X	10	1, 3, 3a, 4, 5	4	1, 2
XI	6	1, 4, 5	6	1, 2, 3
XII	9	M, 1, 1a, 2, 3	6	1, 2, 3

Abdominal legs II- III short, with one subapical seta only. Accessory setae on urosternites I - VII short hair-like. Urosternites I - IV with one middle pore. Urostemite V with 2 or 3 asymmetrical pores. Urosternites VI- VII with one pair of symmetrical pore on the posterior part and with one group of three small pores situated medially, anteriorly to seta *Ac* (Figs. 9-10, 13, 15).

Striate band on abdominal segment VIII well developed. Segment VIII with paired pore *psm* on urotergite and without pores on urostemite. Comb on abdomen VIII posteriorly rounded and protrudes backwards with 17-20 similar teeth on hind margin (Figs. 14, 17).

Segments IX- XI without pores on urotergites and urosternites. Seta 1 and seta 2 on urotergite IX in equal length. Segment XI with 3 + 3 setae on urotergite, seta 4 longer than 1 and 5, seta 1 and 3 on urostemite extremely long. Seta 1 on urotergite XII very short, 2 and 3 long. Single middle pore present on the urotergite XII,

and paired pore *al* also present on urostemite XII (Figs 18-19). Female squama genitalis moderate in length and with short subuliform acrostyli (Fig. 16).

Chaetal variability. Abdominal segment II of holotype with asymmetrical *P3a* on the left of urotergite and with asymmetrical *A3* on the left of urostemite. Abdominal VI of holotype asymmetrical lacked *P1a* on the left of urosternite. Abdominal segment VII of paratype LN002 asymmetrical lacked *A2* on the right of urosternite; prosternum of paratype LN004 asymmetrical lacked *A2* on the left.

Etymology. The species is named after Qian Mountain where the type specimens were collected.

Younger instars. Unknown.

Holotype ♀, (No. LN001) (mounted), Mt. Qian (41°05' N, 123°27' E; 210 m alt.), Anshan, Liaoning, China, 3 June 1994, collected by Mr. XIE Rong Dong and Mr. ZHANG Jun. Paratypes: 2 ♀ ♀ (No. LN002, LN003), 1 ♂ (No. LN004) (mounted), same data as for holotype.

Distribution. Liaoning Province, Northeast China.

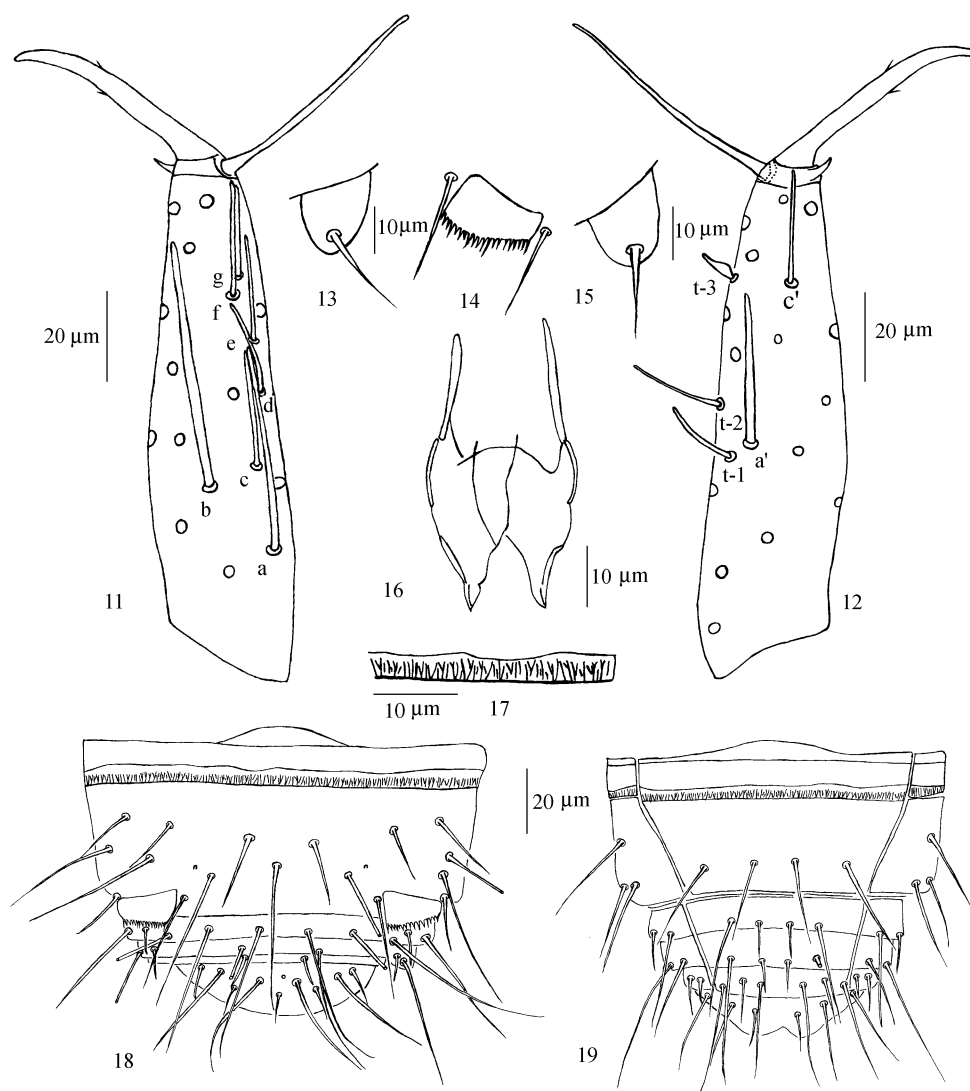
Remarks. The new species can be distinguished from other known species of *Filientomon* by only one seta on abdominal legs II and III, however, the chaetotaxy on the body and sensilla on fortarsus (especially the sensillum *t*-1) of new species is similar to the rest species of the genus. So we place the present new species into the genus *Filientomon*.

The ten known species of *Filientomon* can be distinguished by the following key.

- Key to the world species of genus *Filientomon* Rusek (1974)
- 1 Urotergites II- VI with 6 pairs of anterior setae, with *A1a* ..... 2  
Urotergites II- VI with 5 pairs of anterior setae, without *A1a* ..... 4
  - 2 Urostemite XI with 4 setae (Russia) .....  
..... F. *duodecimsetosum* Nakamura, 2004
  - Urostemite XI with 6 setae ..... 3
  - 3 Urotergites VI and VII with posterior seta *P1a'* (Japan) .....  
..... F. *lubricum* (Imadaté, 1956)
  - Urotergites VI and VII without posterior seta *P1a'* (Japan) .....  
..... F. *gentaroanum* Nakamura, 2001
  - 4 Urotergite VII without *A1* (USA) ..... F. *barberi* (Ewing, 1921)
  - Urotergite VII with *A1* ..... 5
  - 5 Urotergite VII with 5 pairs of anterior setae, *A1*, *A2*, *A3*, *A4* and *A5* ..... 6  
Urotergite VII with 6 pairs of anterior setae, *A1*, *A1a*, *A2*, *A3*, *A4* and *A5* ..... 7
  - 6 Abdominal legs II and III with only one seta (China) .....  
..... F. *qianshanense* sp. nov.
  - Abdominal legs II and III with two setae (Siberia) .....  
..... F. *sibiricum* Széptycki, 1988
  - 7 Urotergites IV- VI with posterior seta *P1a'* (Japan) .....  
..... F. *kurosai* (Imadaté, 1964)
  - Urotergites IV- VI without posterior seta *P1a'* ..... 8
  - 8 Urosternites IV- VI without middle seta *Ac* (Korea) .....  
..... F. *lipartiti* Lee & Rim, 1988
  - Urosternites IV- VI with middle seta *Ac* ..... 9
  - 9 Accessory setae on urotergites II- VI longer than 1/4 of *P1* and seta like (China, Japan, Korea) ..... F. *takanawanum* (Imadaté, 1956)
  - Accessory setae on urotergites II- VI blunt and short, less than 1/5 of *P1* and sensillum like (Korea) ..... F. *iamdati* Lee & Rim, 1988

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Figs 11-19. *Filientomon qianshanense* sp. nov. 11. Foretarsus, exterior view. 12. Foretarsus, interior view. 13. Abdominal leg II. 14. Comb on abdominal VIII. 15. Abdominal leg III. 16. Female squama genitalis. 17. Part of striate band on abdominal VIII. 18. Urotergites VIII XII. 19. Urosternites VIII XII.

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中国东北原尾虫一新种记述 (原尾纲, 科)

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摘 要 记述了采自辽宁省鞍山市千山的原尾虫 1 新种, 千山线毛 *Filientomon qianshanense* sp. nov., 新种第 II、III 对腹足上各仅具 1 根刚毛, 前足跗节末端的爪上具有内外悬片各 1

个。文中给出了线毛 属世界种类检索表。新种模式标本保存在上海昆虫博物馆。

关键词 原尾纲, 科, 线毛 属, 新种, 中国.

中图分类号 Q969. 11